

Dark matter searches and cryogenic semiconductor detectors

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Experimental searches for dark matter employ a wide variety of detectors in order to unambiguously identify nuclear recoils at the lowest recoil energies possible. The Cryogenic Dark Matter Search (CDMS) uses Ge and Si detectors at ultra-low temperatures (~ 50 mK) for this purpose.

Independent ionization and phonon readouts on the CDMS detectors allow for event-by-event discrimination between nuclear and electron recoil events down to recoil energies in the range 5 - 10 keV. A phonon amplification mode of operation allows statistical discrimination for lower recoil energies. The application of these two readout modes to the CDMS detectors will be discussed. In addition, the possibility of using these kinds of detectors for low-rate nuclear physics experiments involving low-energy neutrons is considered.